

**What is claimed is:**

5            [1)    **A solid diamond electron emitter comprising a diamond greater than 5 $\mu$  in thickness having a pointed surface with a radius of less than about 100 $\mu$ .**

10            2) **The solid diamond electron emitter of claim 1 wherein said radius is less than about 10 $\mu$ .**

15            3) **The solid diamond electron emitter of claim 2 wherein said radius ranges from about 3 angstroms to about 3 $\mu$ .**

20            4) **The solid diamond electron emitter of claim 2 wherein said point has a surface roughness of between about 20 angstroms and about 10 $\mu$ .]**

25            5) **The solid diamond electron emitter of claim [5] 18 wherein said point has a surface roughness below about 10 angstroms.**

30            6) **The solid diamond electron emitter of claim 1 wherein said point is produced using a non-contact machining technique.**



7) The solid diamond electron emitter of claim 6 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.]

5 8) The solid diamond electron emitter of claim [5] 18 wherein said radius is less than about  $10[\mu\text{m}]$ .

9) The solid diamond electron emitter of claim [5] 18 wherein said radius ranges from about 3 angstroms to about  $3[\mu\text{m}]$ .

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10) The solid diamond electron emitter of claim [1] 18 further including a conductive shank to which said diamond is adhered.

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11) The solid diamond electron emitter of claim 10 wherein said diamond is adhered to said conductive shank by a vapor deposited layer of palladium or titanium.

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12) The solid diamond field emitter of claim 10 wherein said radius is less than about  $10[\mu\text{m}]$ .

13) The solid diamond electron emitter of claim 10 wherein said radius ranges from about 3 angstroms to about  $3[\mu\text{m}]$ .

14) The solid diamond electron field emitter of claim 10 wherein said point is produced using a non-contact machining technique.

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15) The solid diamond electron emitter of claim 14 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

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[16) A field emitter extractor gauge comprising a field emitter array, an anode grid, a focus plate, a reflector and a collector wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than  $5\mu$  in thickness having a pointed surface with a radius of less than about  $100\mu$ .

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17) A residual gas analyzer comprising a field emitter array, an anode grid, a focus plate and a quadrupole wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than  $5\mu$  in thickness having a pointed surface with a radius of less than about  $100\mu$ .]

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**18) A solid diamond electron emitter comprising a diamond**  
**greater than 5 $\mu$ m in thickness having a pointed surface with a**  
**radius of less than about 100 $\mu$ m, said pointed surface having a**  
**roughness of between about 20 angstroms and about 10 $\mu$ m.**

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**19) A field emitter extractor gauge comprising a field emitter**  
**array, an anode grid, a focus plate, a reflector and a collector**  
**wherein said field emitter array comprises an array of solid**  
**diamond electron emitters each comprising a diamond greater**  
**than 5 $\mu$ m in thickness having a pointed surface with a radius**  
**of less than about 100 $\mu$ m, said pointed surface having a**  
**roughness of between about 20 angstroms and about 10 $\mu$ m.**

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